

Engineering Design Report Guideline

Please be aware additional section may be added or removed specific to the project at hand

Abstract/ Executive Summery, (1 paragraph)

- Microcosm of entire paper
- Contains essential key information from each section *only* – it is brief!
- Covers design highlights
- Gives brief explanation of problem
- How design solves problem
- Presents the main evaluation and conclusions of design

I. Problem Definition

i. Introduction: Problem Statement (1-2 paragraphs)

- Explains the problem to be solved, who are the stakeholders
- Explains importance of the problem (Why does it matter? Why is more information needed?)
- States specific, not detailed, measures of success

ii. Literature Research/ Technical Review:

- Summarizes and *evaluates* the literature that you have used in your study by considering:
 - How that literature has contributed to your design
 - How that literature informs your own research and understanding of the problem
 - The strengths and weaknesses of previous designs and problem solutions

Two main components in this session

a. Detailed background and predominant features of the problem, (3-4 paragraphs)

- Science behind the problem
- Detailed explanation of the problem to be solved

b. What already exists to solve the problem,(3+ paragraphs)

- List existing technologies or method relevant to the problem.
- How these technologies solve the problem,
 - Description of their approach to the solution, how they work, are constructed, science behind them
- Their strengths and weaknesses

iii. Design Requirements

State the most important measurable requirements for your design to successfully solve problem.

Present key requirement (usually no more than 6) in table format:

Design Requirement	Importance	Units	Marginal value	Ideal value
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Design Requirement: something that you can measure.

Importance: Scaled from 1 to 5, low to essential

Units: correspond to your measurement; mm, °C, kg, etc.

Marginal value: states the value, or range, for the design requirement that the stakeholder will tolerate.

Ideal value: The target for the design requirement that you want to meet.

Include additional criteria in appendices

Requirements come from stakeholders and/ or researching the problem

What are the specific measurable parameters the design must meet

Must be concrete criteria that you can be test or evaluate on computer modeling

Include numerical values of all requirements

If using a performance index for evaluation of design, explain components here

How does each component influence index, individually or grouped

II. Design Description:

Overview or summery of your design, (2-3 paragraphs)

Describe what your design does

Include and reference technical drawings, hand or CAD (**no photos here**)

Detailed description, (3+ paragraphs, each component gets 1 paragraph)

Split design up into components parts explain as subsections

Describe the different components individually in detail

Use general drawings or diagrams to aid in descriptions

- For programs include pieces of code and graphical flow chart

- For processes include graphical representation of process flow

-Include complete detailed drawings or code in appendices

Uses, (Short and to the point 1-2 paragraphs)

What does the design do

What is the use of the design

How does a stakeholder use the design

III. Solution Evaluation

i. Overview of approach and testing plan (1-2 paragraph)

Explain if testing plan was done using experimental testing of prototypes, computer modeling/ simulations, hand calculations, stakeholder use, or a combination of any of the above

Summery table of key design requirements from design requirements sections

Design requirement	Target value	Testing Method
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ii. Prototype Description (1-2 paragraphs)

State the purpose and object for building a prototype

What does the prototype do

Provide brief description of Prototype

List key features

Include photographs and if fitting QR code links to video of prototypes
you may include detailed description in appendices

iii. Testing results

Complete based on previously stated design requirements

For each requirement explain the following (1-2 paragraph per)

- i. Description of requirement
- ii. Why it is important
- iii. How it was evaluated
- iv. Results you found, use discrete values, graphs, tables, diagram, charts, etc. cite at visual representations of data within paragraph
- v. Explanation of result,
 - Did it meet requirements,
 - To what degree did it meet requirement
 - Indicates key trends or relationships
 - Highlights expected and/or unexpected findings

Include a description and drawing or photo of testing apparatus, set up and location.

Visual representation of each requirement results:

Graphs, tables, diagrams, charts

Performance index score, If applicable

Show PI formula

Identify where inputs come from

Report score

iv. Effectiveness of your design (3-4 paragraphs)

Did your design meet all the stated requirements

If so it should be, at minimum, a good design

Does your design solve the problem you stated in the problem statement

Comparison to literature

Base assessment on evaluation data you collected

To what degree did it solve the problem (marginally, ideally)

Comments on unexpected results, offering hypothesis for them

Assess or grade the overall effectiveness of design

Use all design requirement results in aggregate to state

Why or why not, use data and specific rational – “not enough time” is not a valid theme

Assess strengths and weakness of design honestly

Do not over or understate your design solution (you are not selling the solution, just reporting your findings)

v. Explain performance index score (1 paragraph)

What does value means, is large PI good or bad

Was score influenced by a particular design requirement,

vi. Problems you over came: (1 short paragraph per.)

In paragraph form per problem

Explain what problem was

Detail the solution/ correction to fix problem

vii. Improvements for design (2-3 paragraphs)

What could be done to bring all requirement result to the optimal value

Improvements with access to better technologies

List technologies that were not incorporated because of constraints that could have improved design, how?

Explanation for how info can be applied in broader context

Possible additional applications of design with limited alterations

Further recommendation for improvement

IV. Reflection on individual and group contribution (2-3 paragraphs)

Description of your contributions and those of each team member.

Summary of how your team worked together.

Positives

Negatives

What you learned about working with a team

Carrier over's to use with next team

V. Works Cite

VI. Appendices

Appendices include the original detailed design and testing data not included earlier. If using code or processed show all of the code or process here. Appendices should be numbered A, B, C, etc.